REMARKS

Claims 30 to 50 are pending in the application. Claims 1-29 are cancelled.

The number of newly submitted claims is 21. Therefore, a claim fee for **one extra claim in excess of 20** in the amount of $9.00 must be paid. Please charge the required fee to Patent and Trademark Office deposit account 50-1199.

Please disregard the remarks portion of the prior amendment dated June 9, 2003, relating to the claim rejections of the office action dated 1/9/2003, and consider the following remarks.

Claim Rejections - 35 U.S.C. 112

Claim 1 stands rejected under 35 U.S.C. 112, 2nd paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention because the method of claim 1 describes a desired result. Moreover claim 1 stands rejected as lacking antecedent basis for several terms.

Claim 1 has been cancelled and in its place new claim 30 is submitted. New claim 30 now sets forth two method steps:

a) arranging mesh layers on top one another and securing the mesh layers spaced apart relative to one another to form a three-dimensional mat system having a mesh arrangement that is preselected based on desired performance properties of the concrete member such that a mesh width of the mesh arrangement of the three-dimensional mat system varies in at least one direction of the three-dimensional mat system;

b) subsequently, infiltrating a slurry containing first aggregate in said at least one direction into the three-dimensional mat system by sieving the first aggregate through the mesh arrangement and positioning the first aggregate according to aggregate size at preselected locations within the three-dimensional mat system, wherein the preselected locations are determined by the mesh arrangement.

The new claim 30 thus clearly describes several method steps for producing the concrete member. Also, antecedent basis has been provided for the terms in question.

Claim Objections

Claims 5-10 are objected to under 37 CFR 1.75(c) as being in improper form

because of multiple dependency issues. The claims have been cancelled and the newly submitted claims no longer contains any multiple dependency.

It is therefore respectfully requested that all claims be examined.

Rejection under 35 U.S.C. 102

Claims 1-4 stand rejected under 35 U.S.C. 102(b) as being anticipated by *US 553,305 (Fordyce)*.

The new claim 30 now claims a method of producing a micro-reinforced concrete member with the following steps:

a) arranging mesh layers on top one another and securing the mesh layers spaced apart relative to one another to form a three-dimensional mat system having a mesh arrangement that is preselected based on desired performance properties of the concrete member such that a mesh width of the mesh arrangement of the three-dimensional mat system varies in at least one direction of the three-dimensional mat system;

b) subsequently, infiltrating a slurry containing first aggregate in said at least one direction into the three-dimensional mat system by sieving the first aggregate through the mesh arrangement and positioning the first aggregate according to aggregate size at preselected locations within the three-dimensional mat system, wherein the preselected locations are determined by the mesh arrangement.

The gist of the invention is that by providing a three-dimensional mat system of mesh layers having a mesh arrangement with varying mesh width, the aggregate can be positioned in the three-dimensional mat system according to the aggregate size at desired locations determined by the mesh width of the mesh layers in that the aggregate is sieved through the three-dimensional mat system and its meshes. The mat system with its three-dimensional arrangement of meshes provides a means for positioning the aggregate precisely at predetermined locations and, accordingly, the concrete member based on the placement of the aggregate can be adjusted with respect to the material performance of the concrete member in regard to load capacity, density, durability, ductility, impact resistance, torsion, rotation, crack control, connectivity, energy absorption etc.

The cited prior art reference *Fordyce* describes a skeleton for fireproof building

construction, wherein the skeleton is to be filled with plaster. Even though the disclosure of this prior art reference shows in Fig. 10 a fine mesh *b* and a coarse mesh *B*, the entire disclosure is silent in regard to positioning of aggregate according to aggregate size by means of sieving through the different meshes.

First of all, the prior art reference deals with plaster. Plaster is fundamentally different from concrete in that it does not contain aggregate (sand and gravel in different proportions), i.e., particles of greatly varying sizes. Plaster (see definition according to Merriam-Webster Online Dictionary provided with the amendment of June 9, 2003) is a pasty composition of lime, water, and sand that hardens on drying and is used for coating walls, ceilings and partitions. Plaster cannot be used as a load bearing member; its only use is that of a finishing coat. Plaster, as a function of its composition, is a uniform pasty mass without having greatly varying aggregate particles contained therein.

Concrete, on the other hand, is a hard strong building material made by mixing a cementing material (Portland cement) and mineral aggregate, i.e, sand and gravel, so that the cement can set and bind the entire mass (see definition of Merriam-Webster Online Dictionary provided with the amendment filed June 9, 2003). Specifically, concrete is made from about 80 % by volume of (graded) aggregate, comprising three parts sand and two parts gravel, and 20 % by volume cement. This provides a flowable mass that hardens to a strong load-bearing material. See copy of *Chambers: Dictionary of Science and Technology* (1999), page 190, submitted June 9, 2003; here, the particulars of cement and concrete are explained.

Thus, based on the different types of material plaster vs. concrete, the skeleton of the prior art and the mat system of the present intention provide different functions. The skeleton of the prior art provides simply a reinforcement of the plaster (see page 2, lines 14 to 16, where it is stated that the skeleton serves to strongly bond and tie the mass). Also, it is clearly stated that the different mesh sizes have simply the function of, in the case of the wider meshes, easily spreading the plaster and ensuring uniform settling of the plaster while the finer meshes retain the bulk of the plaster so that only a small portion of the plaster will pass through the meshes of the sides making available portions of the plaster for smoothing the surfaces. This is described on page 1, line 98, through page 2,

line 6. Since plaster is a uniform pasty mass, there is nothing that could be sieved or positioned precisely within the three-dimensional mat system. The plaster has a uniform appearance as clearly evidenced by the various drawings of the prior art reference.

On the other hand, concrete, as is well illustrated in the schematic provided in *Chambers*, contains aggregate of vastly different sizes and this, in combination with the three-dimensional mat system of the mesh layers having varying mesh widths allows for positioning of aggregate at certain locations within the concrete member in accordance with the distribution of the mesh widths provided in the mat system.

The concept of aggregate distribution across a cross-section of the concrete member that is made possible by the arrangement of mesh layers of varying mesh width is not taught or suggested by the cited prior art reference, particularly, since, firstly, the material used for filling the skeleton has no variation in the particle size (only sand is used in plaster) so that there is nothing to be sieved or positioned at particular locations (page 2, lines 51-57, describes that the plaster passes readily through the coarse meshes and is caught by the side piece where the finer mesh only allows a small quantity of the plaster to pass through, i.e., the side pieces *b* are retainers) and, secondly, the skeleton is provided, as stated in the prior art reference, simply as a structural support.

The present invention provides a sieving (or screening) action for the aggregate by means of the three-dimensional mat system comprised of a mesh arrangement with varying mesh widths so that the individual mesh layers of the mat system act as a template to precisely place the aggregate according to size in the three-dimensional mat structure.

The mat system has several functions: it is a sieve for positioning the aggregate; it acts as a micro-reinforcement; and it provides a template for positioning the aggregate.

The concrete members manufactured according to the present invention enable for the first time a three-dimensional stiffness control in a single concrete member by means of the sieving action of the mat system since the mat system with its varying mesh widths allows a precise positioning of the aggregate at desired locations according to size so that within the cross-section of the concrete member high resistance in compression zones and elastic performance in the tension zones can be produced as desired. This allows a multi-functional multi-layer concrete member that can be manufactured to be very slim (0.5 to

4 inches).

The distribution of coarse aggregate, retained by a mesh layer of a small mesh diameter, within one layer of the concrete member provides, for example, a modulus of elasticity of 50,000 MPa, while a zone created by a medium mesh width retaining medium size aggregate provides a modulus of elasticity of 35,000 MPa, and a modulus of elasticity of a fine layer created by large mesh width creates a concrete containing fine sand and thus a layer having a modulus of elasticity of 20,000 MPa. Such arrangements are illustrated in the drawings Figs. 9, 10, 11, 12 of the present application.

In summarizing the above, the reference *Fordyce* does not claim any particular sieving effect and distribution of the aggregate across the cross-section of the member since plaster contains only uniform sand. The present invention enables positioning of coarse aggregate in the compression zone and a fine sand zone in the tension zone thus optimizing in a simple way the performance of the concrete member. The precise positioning by means of the sieving action allows for variation of stiffness across the cross-section. The concrete members manufactured according to the invention therefore can provide high stiffness (modules of elasticity) in the compression zone and lower stiffness in the tension zone. Bending tests have demonstrated that the strain in the compressions zone is always smaller than the strain in the tension zone. The variation of stiffness allows an adjustment of the material performance to the real load conditions and deformations. This means that in the compression zone the resistance is increased and in the tension zone the material stays uncracked until the ultimate limit state.

Therefore, the inventive feature of positioning the aggregate according to aggregate size within the three-dimensional mat system at desired locations in a three-dimensional mat system having a mesh arrangement that is preselected based on desired performance properties of the concrete member such that a mesh width of the mesh arrangement of the three-dimensional mat system varies in at least one direction of the three-dimensional mat system and by sieving the aggregate through the mesh arrangement is not taught or suggested by the prior art reference *Fordyce*.

Claim 30 and its dependent claims are therefore believed to be allowable.

CONCLUSION

In view of the foregoing, it is submitted that this application is now in condition for allowance and such allowance is respectfully solicited.

Should the Examiner have any further objections or suggestions, the undersigned would appreciate a phone call or e-mail from the examiner to discuss appropriate amendments to place the application into condition for allowance.

Authorization is herewith given to charge any fees or any shortages in any fees required during prosecution of this application and not paid by other means to Patent and Trademark Office deposit account 50-1199.

Respectfully submitted on February 27, 2004.

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